

SUBSURFACE DRAIN CONSTRUCTION SPECIFICATION

1. SCOPE

The work shall consist of furnishing materials and installing all components of the subsurface drain as outlined in the specification and the drawings.

2. MATERIALS

- a. DRAINFILL AGGREGATE shall meet the requirements of Penn DOT, Publication 408, Section 703, fine and coarse aggregate. The size and gradation shall be as specified in the additional conditions of this specification or on the drawings.
- b. PIPE shall meet the requirements of Table 1, and as set forth in Section 9 and/or on the drawings.

All pipes shall be clearly marked with the appropriate specification designation. If plastic pipe is stored on site for a length of time, it should be protected from sunlight. At the time of installation, it should be kept as cool as possible to minimize elongation of the pipe during installation.
- c. Geotextile shall meet the requirements as outlined in PennDOT Publication 408, Section 735, Class 1, Subsurface Drainage.

Table 1 – Drain Pipe Requirements

Type	Specification
Clay drain tile, solid & perforated	ASTM-C-4
Clay pipe, perforated, standard and extra strength	ASTM-C-700
Clay pipe testing	ASTM-C-301
Concrete drain tile	ASTM-C-412
Concrete pipe for irrigation or drainage	ASTM-C-118
Concrete pipe or tile, determining physical properties of	ASTM-C-497
Concrete sewer, storm drain and culvert pipe	ASTM-C-14
Reinforced concrete culvert, storm drain and sewer pipe	ASTM-C-76
Perforated concrete pipe	ASTM-C-444
Portland cement	ASTM-C-150
Pipe, bituminized fiber & fitting	Federal Specification SS-P-1540
Styrene rubber (SR) plastic drain pipe & fitting	ASTM-D-2852
Polyvinyl chloride (PVC) sewer pipe & fitting	ASTM-D-2729
Polyvinyl chloride (PVC) pipe	ASTM-D-3034, type PSM
Corrugated polyethylene tubing & fitting (3-6 inch)	ASTM-F-405
Corrugated polyethylene tubing & fitting (8-24 inch)	ASTM-F-667
Pipe, corrugated (steel, polymer coated)	ASTM-A-762
Pipe, corrugated (steel, zinc coated)	ASTM-A-760

3. SITE PREPERATION

All trees, brush, fences and rubbish shall be cleared within the area that the subsurface drain will be installed. All material removed by the clearing and grubbing operation shall be disposed of as directed by the Owner or his/her Representative.

4. INSPECTION AND MATERIAL HANDLING

Material for subsurface drains shall be carefully inspected before the drains are installed. If applicable, clay and concrete tile shall be checked for damage from freezing and thawing before it is installed. Bituminized fiber and plastic pipe and tubing shall be protected from hazard causing deformation or warping. Plastic pipe and tubing with physical imperfections shall not be installed. Any damaged section shall be removed and replaced. All material shall be satisfactory for its intended use and shall meet applicable specifications and requirements.

5. SAFETY

All positive responses from the Pennsylvania One Call System should be shown on the drawings and the Pennsylvania One Call serial number noted on the plans. It is the Contractor's or Landowner's responsibility to contact the affected utility for marking at the time of construction.

The Contractor must comply with OSHA requirements Part 1926, subpart P, for protection of workers entering trench.

6. INSTALLATION

Flexible conduits, such as plastic pipe or tubing and bituminized fiber pipe, shall be installed, according to the requirements in ASTM-F-449, "Standard Recommended Practice for Subsurface Installation of Corrugated Thermoplastic Tubing for Agricultural Drainage or Water Table Control."

All subsurface drains shall be laid to line and grade and covered with approved blinding, envelope or filter material to a depth of not less than three inches over the top of the pipe. If an impervious sheet is used over the drain, at least three inches of blinding material must cover the sheet. No reversals in grade of the conduit shall be permitted.

If the conduit is to be laid in a rock trench or if rock is exposed at the bottom of the trench, the rock shall be removed below grade so that the trench can be backfilled, compacted and bedded. When completed, the tile conduit shall be not less than two inches from the rock.

Joints between drain tiles shall not exceed 1/8 inch except in sandy soils where the closest possible fit must be obtained and in organic soil where some of the more fibrous soil types make it desirable to slightly increase the space between tiles.

Earth backfill material shall be placed in the trench in a manner to ensure that the conduit does not become displaced and so that the filter and bedding material, after backfilling, meet the requirements of the plans and specifications.

If a filter is needed, no part of the conduit containing openings shall be left exposed. If a sand-gravel filter material is used, it shall be a gradation that is compatible with the base material in the trench. The trench shall be over excavated three inches and backfilled to grade with filter material. After the conduit is placed on the filter material, additional filter material shall be placed over the conduit to fill the trench to a depth of three inches over the conduit.

7. FITTINGS AND CONNECTIONS

All fitting and connections for pipe shall be made with manufacturer-supplied components made for the intended purpose.

8. CONDUIT PERFORATIONS

If perforations are specified, the water inlet area shall be at least 1inch/foot of the pipe length. The perforations shall be either circular or slots equally spaced around the circumference of the pipe in not less than three rows. Circular perforations shall not exceed 3/16 inch in diameter and slots shall not be more than 1/8 inch wide and 1 ¼ inch long for 3, 4 and 5 inch diameter pipe, or 1 ½ inch for 6 and 8 inch diameter pipe, or 1 ¾ inch for 10 and 12 inch diameter pipe. All slots and circular perforations shall be cleanly cut.

9. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE: